

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

1. (Currently Amended) A method of querying a database during database recovery, the method comprising:

reading a log file containing log file transactions to find incomplete transactions;

comparing the log file transactions with transactions reflected in the database to find unentered transactions;

inserting the unentered transactions into the database;

asserting a first lock type on a data item associated with each incomplete transaction;

removing a transaction reflected in the database if the transaction is not committed in the log file, wherein the removal of the transaction de-asserts a first lock type on a data item associated with the incomplete transaction; and

permitting a snapshot query of the database concurrent with the removal of an incomplete transaction, wherein if a first lock type is detected on a first data item, the snapshot query is delayed until the first lock type is de-asserted.

2. (Original) The method of claim 1, wherein the step of asserting a first lock type comprises asserting at least one of a row, a page, a table and an index..

3. (Original) The method of claim 1, wherein the step of asserting a first lock type comprises asserting a redo lock.

4. (Original) The method of claim 1, further comprising:

permitting a snapshot query of the database concurrent with the removal of an incomplete transaction, wherein if a second lock type is detected on a second transaction, a read from a previous version of the second transaction is performed.

5. (Original) The method of claim 4, wherein the second lock type comprises one of a read and a write lock.

6. (Withdrawn) A method of querying a database during database recovery using a snapshot of the database, the method comprising:

reading a log file containing log file transactions to find incomplete transactions;

comparing the log file transactions with transactions reflected in the database to find unentered transactions;

inserting the unentered transactions into the database;

removing an incomplete transaction from the database if the incomplete transaction is not committed in the log file;

permitting a snapshot query against the database concurrent with the removing of an incomplete transaction, wherein a concurrent but earlier started query asserted a lock on a data item and stored a first version of the data item; and

testing for a lock related to a data item of the snapshot query, wherein if a lock related to a data item corresponding to the snapshot query is detected, a read from a first version of the data item is performed.

7. (Withdrawn) The method of claim 6, wherein the step of permitting a snapshot query comprises asserting a one of a read and a write lock on the data item.

8. (Withdrawn) A method of querying a database during recovery of the database, the method comprising:

reading a log file containing log file transactions to find incomplete transactions;

identifying unentered transactions within the log file transactions;

inserting the unentered transactions into the database; wherein a corresponding version record is generated and a lock on a corresponding individual data item is asserted;

removing a transaction from the database if the transaction is not committed in the log file wherein the removal of the transaction de-asserts a lock on a corresponding individual data item;

permitting a snapshot query against the database concurrent with the removal of the incomplete transactions; and

testing for a commit time related to a data item corresponding to the new query; wherein if commit time is after the start time of the new query, a read from a previous version record of the data item is performed.

9. (Withdrawn) The method of claim 8, wherein inserting the unentered transactions into the database further comprises inserting the unentered transactions into a mirror database before a primary database fails.

10. (Withdrawn) The method of claim 9, wherein the unentered transactions are shipped from a primary database to a mirror database.

11. (Original) A system for querying a database during recovery of the database, the system comprising:

a processor having access to memory, the memory having instructions of a software component; and

a software component which, when executed:

reads a log file containing log file transactions to find incomplete transactions;

compares the log file transactions with transactions reflected in the database to find unentered transactions;

performs redo operations with the unentered transactions;

performs undo operations with uncommitted transactions;

permits a snapshot query against the database concurrent with the undo operations; and

tests for a lock related to a data item of the snapshot query; wherein if a lock related to a redo operation is detected, a read from a previous version of the data item is performed.

12. (Original) The system of claim 11, wherein locks are asserted upon the redo operation of one of a row, a page, a table and an index.

13. (Original) The system of claim 11, further comprising a display on which to view query results.

14. (Withdrawn) A system for the querying of a data base during recovery of the database, the system comprising:

a mirror database where in the mirror database receives log file transactions from a primary database;

a database processor in the mirror database, the database processor having access to memory, the memory having instructions of software components; and

a software component which, when executed,

reads the log file transactions to identify incomplete transactions;

compares the log file transactions with transactions reflected in the database to find unentered transactions;

performs redo operations using the unentered transactions, the redo operation asserting locks, wherein a corresponding version record is generated and a lock on a corresponding individual data item is asserted;

performing undo operations if a transaction is not committed in the log file, wherein an undo operation de-asserts a lock on a corresponding individual data item;

permitting a snapshot query against the mirror database concurrent with undo operations; and

testing for a lock related to a data item corresponding to the snapshot query; wherein if a lock is detected, a read from a previous version record of the data item is performed.

15. (Withdrawn) The system of claim 14, wherein performing redo operations further comprises performing redo operations on the mirror database before a primary database fails.

16. (Withdrawn) The system of claim 14, wherein performing undo operations occurs after a primary database fails.

17. (Original) A computer-readable medium having computer-executable instructions for performing a method to query a database during recovery of the database, the method comprising:

reading a log file containing log file transactions to find incomplete transactions.

comparing the log file transactions with transactions reflected in the database to find unentered transactions;

inserting the unentered transactions into the database;

asserting a first lock type on a data item associated with each incomplete transaction;

removing a transaction reflected in the database if the transaction is not committed in the log file, wherein the removal of the transaction de-asserts a first lock type on a data item associated with the incomplete transaction; and

permitting a snapshot query of the database concurrent with the removal of an incomplete transaction, wherein if a first lock type is detected on a first data item, the snapshot query is delayed until the first lock type is de-asserted.

18. (Original) The computer-readable medium of claim 17, the method further comprising:

permitting a snapshot query of the database concurrent with the removal of an incomplete transaction, wherein if a second lock type is detected on a second transaction, a read from a previous version of the second transaction is performed.

19. (Withdrawn) A computer-readable medium having computer-executable instructions for performing a method to query a database during recovery of the database using a snapshot of the database, the method comprising:

reading a log file containing log file transactions to find incomplete transactions;

comparing the log file transactions with transactions reflected in the database to find unentered transactions;

inserting the unentered transactions into the database;

removing an incomplete transaction from the database if the incomplete transaction is not committed in the log file;

permitting a snapshot query against the database concurrent with the removing of an incomplete transaction, wherein a concurrent but earlier started query asserted a lock on a data item and stored a first version of the data item; and

testing for a lock related to a data item of the snapshot query, wherein if a lock related to a data item corresponding to the snapshot query is detected, a read from a first version of the data item is performed.

20. (Withdrawn) The computer-readable medium of claim 19, wherein the step of permitting a snapshot query comprises asserting one of a read and a write lock on the data item.

21. (Withdrawn) A computer-readable medium having computer-executable instructions for performing a method to query a database during recovery of the database, the method comprising:

reading a log file containing log file transactions to find incomplete transactions;

identifying unentered transactions within the log file transactions;

inserting the unentered transactions into the database; wherein a corresponding version record is generated and a lock on a corresponding individual data item is asserted;

removing a transaction from the database if the transaction is not committed in the log file wherein the removal of the transaction de-asserts a lock on a corresponding individual data item;

permitting a snapshot query against the database concurrent with the removal of the incomplete transactions; and

testing for a commit time related to a data item corresponding to the new query; wherein if commit time is after the start time of the new query, a read from a previous version record of the data item is performed.

22. (Withdrawn) The computer-readable medium of claim 21, wherein the method step of inserting the unentered transactions into the database further comprises inserting the unentered transactions into a mirror database before a primary database fails.

23. (Withdrawn) The computer-readable medium of claim 21, wherein the unentered transactions are shipped from a primary database to a mirror database.

24. (Withdrawn) A system for querying a database during recovery of the database, the system comprising:

a processor having access to memory, the processor having means for performing a method comprising:

reading a log file containing log file transactions to find incomplete transactions;

comparing the log file transactions with transactions reflected in the database to find at least one unentered transaction;

conducting at least one redo operation with the at least one unentered transaction;

conducting at least one undo operation with at least one uncommitted transaction;

allowing a snapshot query against the database concurrent with the at least one undo operation; and

testing for a lock related to a data item of the snapshot query; wherein if a lock related to a redo operation is detected, a read from a previous version of the data item is performed.

25. (Withdrawn) A system for the querying of a data base during recovery of the database, the system comprising:

a mirror database having means to receive log file transactions from a primary database;

a database processor in the mirror database, the database processor having means to:

read the log file transactions to identify incomplete transactions;

perform redo operations using unentered transactions, the redo operation asserting locks; wherein a corresponding version record is generated and a lock on a corresponding individual data item is asserted;

perform undo operations if a transaction is not committed in the log file, wherein an undo operation de-asserts a lock on a corresponding individual data item;

permit a snapshot query against the mirror database concurrent with undo operations; and

DOCKET NO.: 307245.01/MSFT-2947
Application No.: 10/812,188
Office Action Dated: March 8, 2006

PATENT

test for a lock related to a data item corresponding to the snapshot query;
wherein if a lock is detected, a read from a previous version record of the data item is
performed.